FIELD METHODS MANUAL - REVISED VOLUNTEER MONITORING PROGRAM SHIPSHEWANA LAKE

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FIELD METHODS MANUAL - REVISED
SHIPSHEWANA LAKE VOLUNTEER MONITORING PROGRAM

This document presents the revised field methods that are to be followed in routine monitoring of the water quality in Shipshewana Lake and watershed by the Shipshewana Community Lake Improvement Association (SCLIA). The continuation of this monitoring program will not only provide high quality data that can be used to characterize the conditions in Shipshewana Lake and watershed, but will also provide a record of the changes occurring in the lake and watershed as the restoration measures are implemented. This information may then be used to ascertain the overall effectiveness of the restoration measures.

The revised field methods manual includes some streamlining of the design used in the 1990 monitoring program. These streamlined features include a reduction in sampling frequency and the number of sampling stations to be monitored. Additionally, the SCLIA will become responsible for locating and contracting with an appropriate analytical laboratory for the required water quality analyses, as well as for compiling the data collected by the volunteers. These functions were previously provided by International Science & Technology, Inc. (IS&T).

SAMPLING FREQUENCY

Lake and watershed sampling will be conducted once per month throughout the restoration of Shipshewana Lake. To allow for variability, it is recommended that an exact sampling date not be specified, but that the sampling date within each month be chosen randomly within a specified timeframe. For example, sample sometime within the first 10 days of the month. Additionally, because separate storm event sampling is not a component of this monitoring program, it is suggested that the sampling be conducted with no concern for weather such that some rain events will be captured.

SAMPLE STATION LOCATION

Six (6) sampling stations will be monitored in Shipshewana Lake and watershed. Their locations are described on Table 1 and denoted in Figure 1. One (1) station is located in the deepest part of

Table 1. Shipshewana Lake sampling station identification.

STATION NUMBER*	DESCRIPTION
2	Geometric center of Shipshewana Lake
4	Mud Lake Ditch mouth
9	Outlet of Mud Lake
5	Cotton Lake Ditch mouth
7	Outlet of Cotton Lake
10	Sarah Davis Ditch

* Station numbers assigned for the 1990 monitoring program.

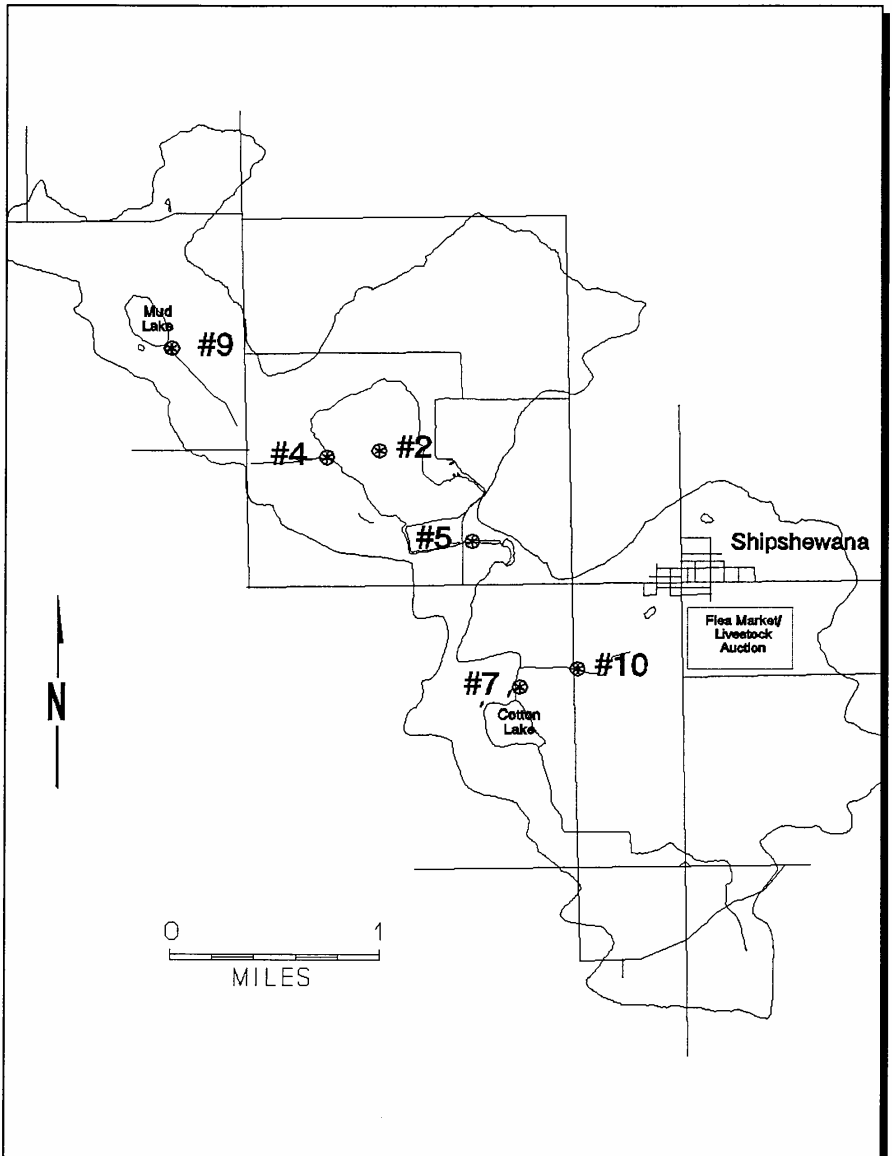

Figure 1. Shipshewana Lake sampling station locations.

Shipshewana Lake, two (2) are located in the Mud Lake Ditch sub-basin, and three (3) are located in the Cotton Lake Ditch sub-basin. It should be noted that station #5 has been relocated upstream on Cotton Lake Ditch from its location during the first year of monitoring.

REQUIRED EQUIPMENT

The following equipment will be required to conduct the field sampling:

- Boat with appropriate safety equipment (in-lake station only)
- YSI Model 51B portable dissolved oxygen meter
- Hanna Pocket pH meter
- Horizontal Van Dorn water sample collection bottle
- Secchi Disk
- Tape measure or yardstick
- Spring-type clothes pins
- Plastic cup (at least one cup capacity)
- Sample containers
- Labels
- Deionized water
- In-situ Data Form
- Field Record Book
- Pencils
- Waterproof Markers
- Cooler

INSTRUMENT CALIBRATION AND MAINTENANCE

Calibrate the dissolved oxygen and pH meters at the beginning of each sampling day following the manufacturers' instructions. The pH meter should be calibrated using the pH 7 and pH 10 buffers. Please remember there is a set screw on the back of the pH meter that should be used for calibration. The calibration date, time, and results are to be recorded in a permanent Field Record Book.

Any maintenance performed on either meter should be recorded, with the date of maintenance noted, in a permanent Instrument Maintenance Record. Instrument maintenance includes battery replacement as well as changing the dissolved oxygen meter electrolyte and membrane.

FIELD METHODS FOR IN-SITU MEASUREMENTS

In-Lake Sampling Station

The following steps are to be followed at the one in-lake station (#2) for every sampling event. The measurements will be entered on an In-situ Data Form (Figure 2) for the in-lake samples.

1. Anchor the boat upwind of the station marker, allowing the boat to drift down to the station location. This is done to minimize disturbance of the water column and lake sediments by the boat motor and/or the anchor. Do NOT drop the anchor alongside of the station marker or tie the boat to the station marker.

2. Record the date, time, and weather information on the In-situ Data Form. Please use the 24 hour military system for time (e.g., 3:00 pm is 15:00). Note any unusual conditions or problems in the comments section of the form, and print the sampler(s) name at the bottom of the form.

3. Lower the Secchi disk into the water on the shaded side of the boat until you can no longer see it. Place a clothes pin on the line at the water's surface. Lower the Secchi disk another 6 to 8 inches and then raise it the until you can just see it through the water surface. Place another clothes pin on the line at the water's surface. Retrieve the Secchi disk and record the average of the two depths in the Secchi depth section on the In-situ Data Form.

4. Measure dissolved oxygen (DO) and temperature (T) at one (1) foot increments from the surface to the lake bottom. Follow the manufacturer's instruction in operating the YSI Oxygen Meter. It is a good idea to gently move the probe up and down approximately 1 inch during the measurement to ensure that there is a flow of water past the probe membrane. Record each pair of readings (DO and T) for each depth on the In-situ Data Form.

5. Collect water samples for in-situ pH measurement from the surface, mid-depth, and one foot above the lake bottom. This should correspond to depths of 1, 6, and 11 ft, respectively. Lower the horizontal Van Dorn sampling bottle to the appropriate depth and close the bottle to collect the sample. Retrieve the bottle onboard the boat, place on a stable surface, and open the vent port.

   pH Measurement: Open the sampling port and pour a small amount of water into a clean plastic cup. Rinse the cup with the water and discard. Repeat this procedure two more times to thoroughly rinse the cup. Fill the cup with water from the sampling bottle and measure the pH using the calibrated pH meter. Record the value at the appropriate depth on the In-situ Data Form.

Watershed Sampling Stations

The following steps are to be followed at the five (5) watershed stations for every sampling event. The measurements will be entered on a Watershed Sample Collection Data Form (Figure 3).

1. Record the date, time and weather information on the Data Form. Please use the 24 hour military system for time, as previously described. Note any unusual conditions or problems associated with each site in the comments section of the form. Print the sampler(s) name at the bottom of the form.

2. Measure the dissolved oxygen (DO) and temperature (T) in the stream at the sample site. Try to avoid taking these measurements in stagnant water or swirling or eddying areas. The bottom sediments should not be disturbed when lowering the probe into the stream. Follow the manufacturer's instructions in operating the YSI Oxygen Meter. Record each pair of readings (DO and T) for each sampling station on the Sample Collection Data Form.

FIELD METHODS FOR WATER SAMPLE COLLECTION

In-Lake Sample Collection

Water samples collected from the in-lake station (#2) are to be analyzed for the parameters listed in Table 2. The analytical methods to be used should provide detection limits as specified in the table and be equivalent to the methods listed.

SHIPSHEWANA LAKE VOLUNTEER MONITORING PROGRAM
IN-SITU DATA FORM

Sample Station: _____ Date: ___ ___ ___
mm dd yy

Secchi Depth (in): ___ ___ . ___ Time: ___ ___ : ___ ___
(24 Hr)

Weather (Temp., Wind direction/speed, Precipitation, Cloud cover)

Depth (ft)	Temp (°C)	DO (mg/L)	pH	Water Sample Collected?
Surface				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Comments

Sampler:

Figure 2. In-situ data form for the in-lake samples.

TABLE 2. Water quality parameters and analytical requirements for lake samples.

Parameter	Detection Limit	Method No. EPA	SM[1]
Total Phosphorus	0.010 mg/l	365.4	424F
Total Kjeldahl Nitrogen	0.050 mg/l	351.2	420B
Nitrate + Nitrite Nitrogen	0.050 mg/l	353.2	
Total Suspended Solids	1.000 mg/l	160.2	209C
Chlorophyll a	0.100 mg/l		1002G

Note: Chlorophyll a analyses will be corrected for Pheophytin, and conducted only during the months of April through October.

[1] USPHA - *Standard Methods for the Examination of Water and Wastewater.*

The following steps for water sample collection are to be followed at the one in-lake station (#2) for every sampling event.

1. Collect the water samples from the surface, mid-depth and one foot above the lake bottom (i.e., depths of 1, 6, and 11 ft, respectively). Thoroughly rinse the horizontal Van Dorn sampling bottle with lake water prior to collecting the samples. Lower the Van Dorn sampling bottle to the appropriate depth and close the bottle to collect the sample. Retrieve the Van Dorn onboard the boat, place on a stable surface, and open the vent port.

2. If a preservative has been added to the sample containers provided by the laboratory, do not rinse the containers. Fill the containers with water from the sampling bottle and replace the cap, excluding as much air as possible. Attach a completed sample label to the sample container.

3. If the sample containers do not contain a preservative (i.e., the Chlorophyll a containers), pour a small amount of water from the Van Dorn into the container. Rinse the container with the water and discard. Repeat this procedure two more times to thoroughly rinse the container. Fill the container with water from the sampling bottle and replace the cap, excluding as much air as possible. Attach a completed label to the sample container. Place the sample containers in the dark and cool to 4°C. This can be accomplished by placing them in an ice chest with ice or coolant.

4. Upon completion of the sample collection, check to make sure that all data forms have been completed and all samples labeled.

SHIPSHEWANA LAKE VOLUNTEER MONITORING PROGRAM
WATERSHED SAMPLE COLLECTION DATA FORM

Date: ____ ____ ____
mm dd yy

Weather (Temp., Wind direction/speed, Precipitation, Cloud cover)

Station #	Temp (°C)	DO (mg/L)	Time Collected	Comments
4				
9				
5				
7				
10				
duplicate				
blank				

Comments

Sampler:

Figure 3. Watershed sample collection data form.

Watershed Sample Collection

Water samples collected from the five (5) stream sites are to be analyzed for the following parameters:

TABLE 3. Water quality parameters and analytical requirements for stream samples.

Parameter	Detection Limit
Total Phosphorus	0.005 mg/l
Total Kjeldahl Nitrogen	0.050 mg/l
Nitrate + Nitrite Nitrogen	0.010 mg/l

The following steps for water sample collection are to be followed at all five (5) stream sites for every sampling event.

1. Collect a grab sample from flowing stream water, avoiding areas of stagnant water or swirling or eddying areas.

2. If possible, collect the sample without entering the flow. If it is necessary to enter the stream, try to avoid disturbing the bottom sediments. Samples should be collected upstream from where you are standing.

3. If a preservative has been added to the sample containers provided by the laboratory, do not rinse the containers.

4. If the sample containers do not contain a preservative, rinse the container by submerging it in the stream with the mouth pointed into the current. Fill the container and discard the rinse water by pouring it over the bottle cap while holding the cap downstream from the sample collection point. Repeat the rinse procedure two more times.

5. To collect the grab sample hold the container firmly, keeping your hands away from the mouth. Without disturbing the sediments, quickly submerge the container in the flow with the mouth pointed into the current and fill it completely. Remove the container from the stream, checking to see that the water level is very near to the top of the container. Replace the cap, excluding as much air as possible. Attach a completed sample label to the sample container.

6. Upon completion of the sample collection, check to make sure that all data forms have been completed and all samples labelled.

7. All samples should be placed in the dark and cooled to 4°C. This can be accomplished by placing them in an ice chest with ice or coolant.

Field Quality Control Samples

Every sampling event should include field quality control check samples. The two types of quality control samples recommended for the Shipshewana monitoring program are field duplicates and field blanks. One field duplicate and one field blank sample should be collected during each sampling event and sent to the analytical laboratory. A separate chlorophyll a field duplicate should be collected from station #2.

1. Field Duplicates. A field duplicate is a sample taken to determine the variability in the sampling procedure and the source sampled. This sample may be collected from either the in-lake stations or the watershed stations. It is important that the site where the duplicate sample is collected be chosen randomly and not always at the site where it is easiest to collect. Collect the field duplicate immediately after the regular sample is collected. The duplicate should be collected in the same manner as the regular sample, but using a second grab sample. Attach a completed label to the sample container.

2. Field Blanks. A field blank is a sample of reagent grade deionized water that is processed through the sampling equipment (e.g., the horizontal Van Dorn sampling bottle or the bottles used to collect stream samples) in the same manner as the actual water sample. This is done to determine if field equipment cleaning procedures are adequate. Ideally, no contaminants will be detected in the field blank. Field blanks may be collected at either lake or stream stations. The location should be selected randomly, as with the field duplicates.

   To collect a field blank at the lake station, rinse the Van Dorn sampling bottle three times with deionized water, then fill the Van Dorn with deionized water. Pour the water from the Van Dorn into the sample container, filling the container. Replace the cap, excluding as much air as possible, and attach a completed label to the container.

   To collect a field blank at a stream station, fill the grab sample bottle with deionized water such that the water level is very near to the top of the container. Replace the cap, excluding as much air as possible. Attach a completed sample label to the sample container. It is recommended that field blanks be specified as sample number "FB-1" on the sample label and laboratory tracking forms.

SAMPLE SHIPPING PREPARATION

Upon completion of the sample collection, check to make sure that all labels have been filled out properly and are attached to the appropriate sample container. Complete a sample tracking form for each cooler to be shipped to each laboratory. It is also a good idea to call the lab on the day you collect the samples to let them know that samples are being shipped to them.

If the samples have not been preserved, it is imperative that they be kept in the dark at 4°C during shipping. The laboratories must receive these samples within 24 hours of collection.

If the samples have been preserved prior to shipping, follow the laboratory's instructions for shipping the samples.

All field data forms and laboratory results should be delivered to the DNR project manager at the LaGrange SCS/SWCD office.

APPENDIX

SHIPSHEWANA LAKE VOLUNTEER MONITORING PROGRAM
IN-SITU DATA FORM

Sample Station: _____ Date: ____ ____ ____
mm dd yy

Secchi Depth (in): ___ ___ . ___ Time: ___ ___ : ___ ___
(24 Hr)

Weather (Temp., Wind direction/speed, Precipitation, Cloud cover)

Depth (ft)	Temp (°C)	DO (mg/L)	pH	Water Sample Collected?
Surface				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Comments

Sampler:

SHIPSHEWANA LAKE VOLUNTEER MONITORING PROGRAM
WATERSHED SAMPLE COLLECTION DATA FORM

Date: ____ ____ ____
mm dd yy

Weather (Temp., Wind direction/speed, Precipitation, Cloud cover)

Station #	Temp (°C)	DO (mg/L)	Time Collected	Comments
4				
9				
5				
7				
10				
duplicate				
blank				

Comments

Sampler: